

THE MINERAL INDUSTRY OF UKRAINE

By Richard M. Levine¹

Ukraine continued to be a major producer of coal, ilmenite, iron ore, manganese ore, steel, and ferroalloys. Also, the country was a lesser producer of a number of other mineral products, including alumina, aluminum, cadmium, germanium, rutile-zirconium ores, secondary lead, mercury, nickel in ferronickel, magnesium, titanium metal and pigment, uranium ore, secondary zinc, and a large number of industrial minerals, including dolomite, graphite, kaolin, limestone fluxes, potash, quartz, salt, soda ash, and a variety of building materials.

In 1995, Ukraine reported a 12% decrease in gross domestic product compared with 1994 with a 13.5% decline in industrial output. In an organizational change, the Government made the former State Committee for Rare and Precious Metals a part of the Ministry of Industry. The Ministry of Industry was responsible for Ukraine's mining and metallurgical sector. Additionally, the Government of Ukraine promulgated and, in late 1994, adopted a new code on mineral resources. The code stipulated that Ukraine's mineral wealth belongs to the state and was not subject to purchase through private means. Private investors, however, could acquire a 99-year concession to develop mineral properties. The code provided for the State's right to inventory the country's mineral wealth, which was to be done by the State Committee on Geology and Utilization of Mineral Resources. Moreover, the code also sanctioned this committee to assign licenses for exploration, survey, and exploitation of mineral deposits by mining and mineral companies, organizations, and/or entities.

In 1995, enterprises in the metallurgical and chemical sectors were operating at only 40% to 50% of capacity owing to a loss of former domestic and former Soviet Union (FSU) markets, which necessitated that these industries seek new foreign markets. According to Ukraine's Minister of Industry, its mining and metals industries were in a critical state. In 1995, compared with that of 1990, output of iron and steel fell by 60% and of fuels by 58%.

The country's mineral industries required substantial capital investment to renovate and upgrade existing facilities. In steelmaking, 55% of production was from open-hearth furnaces, 43.5% from oxygen converter furnaces, and the remainder electric arc. Continuous casting accounted for 12% of steel production.

Production of crude steel and pig iron in 1995 reportedly decreased compared with 1994 by about 3% and 6%

respectively, while production of marketable manganese ore increased by about 7%. A program drawn up by the Government for the renovation of the mining and metallurgical sector up to the year 2010 called for shutting uneconomic enterprises and upgrading capacity at key ferrous metallurgical enterprises including the Azovstal steel mill, the Dneprospetstal electrometallurgical plant, the Krivoy Rog steel mill, the Makeevka metallurgical complex, the Nizhnedneprovsk pipe mill, and the Zaporozhstal steel mill. Plans called for increasing production of rolled steel to 20 million metric tons per year (Mt/yr) by the year 2000 and to 25 Mt/yr by 2010. Plans called for investment funds to come from the enterprises, the Government, and foreign entities. Also, plans for 1996 called for privatization of a number of major enterprises, including large steel mills, with the participation of foreign investors.

According to the Soviet Mining Encyclopedia, Volume V, 1991, Ukraine has 26.85 billion metric tons (t) of "balansovye" iron ore reserves, which according to the Soviet reserve classification system used by Ukraine are the economically exploitable portion of the reserves in categories A, B, C₁, and C₂. The Soviet reserve classification system, however, is not comparable to systems used in market economy countries as it did not apply market economy criteria in assessing reserves as having to be profitable in existing market conditions using existing technology. In addition to the balansovye reserves, the Ukrainian State Fund of Geological Information (Geoinform) reported that the country had significant potential to increase iron ore reserves based on prognosticated resources which are the undiscovered resources in categories P₁, P₂, and P₃ of the Soviet reserve classification system. (For an explanation of the Soviet reserve classification system, refer to the Russia chapter of the 1996 U.S. Geological Survey's Minerals Yearbook).

Iron ore production which was centered in the Krivoy Rog basin had decreased considerably since the late 1980's and mines were working at less than one-half capacity of about 125 Mt/yr of marketable iron ore. The iron content of direct shipping ore averaged 58% and the iron content of concentrate averaged 65%. There were six open pit mining and beneficiation complexes in operation and four underground mining complexes. Approximately 75% of the output was from open pits and the remaining 25% from underground mines.

Ukraine, according to the journal *Mineral'ni Resursi Ukraini*, Kiev, February 1995, page 5, published by Geoinform, based on the Soviet reserve classification system possesses the world's second largest proven reserves of manganese after South Africa, amounting to almost 2.5 billion t of ore. Proven reserves according to the Soviet reserve classification system are all reserves in categories A, B, and C₁. The country's principal reserves of manganese ore were found at the Nikopol and Bolshoy Tokmak deposits. In past years, the output of easily beneficiated oxide and oxide-carbonate manganese ores comprised between 85% and 98% of the Ukraine's annual production of up to 17 million tons of crude manganese ore. Currently, the oxide ores amount to less than 25% of the country's "balansovye" reserves of manganese ore which reportedly should be sufficient to last 20 years.

Ukraine's two major manganese mining and beneficiation complexes, the Marganets and Ordzhonikidze, reportedly were both being privatized in 1995. Mining reportedly was halted at the experimental Tavrichesky complex exploiting the Bolshoy Tokmak deposit owing to low manganese yields from the ore. Also, increases in the cost of electricity were causing output to fall at the Nikopol and Zaporozhye ferroalloys plant that were major producers of manganese ferroalloys.

Additionally, Ukraine reported having undeveloped chromite resources associated with ultra-basic massifs in the central Pobuzh region. The prognosticated chromite resources in this region reportedly amount to 2.6 Mt (Cr₂O₃ basis). Plans call for developing the Kapitanovskoye chromite deposit to supply domestic industry.

Despite the declining economic indicators and the decrease in output of major ferrous metals and coal during the first half of the 1990's, Ukraine during this same period experienced increased production of nonferrous metals. Plans for the mining and metallurgical sectors to the year 2010 envisaged some growth in ferrous metals output. However, the output of all ferrous metals by the year 2010 was still planned to be below the 1990 production level. Although no officially reported data were available for this sector, the trend for the first half of the 1990's showed sharp production increases for nonferrous metals.

Ukraine reported possessing a wide range of nonferrous metal deposits that included copper, gold and silver, lead and zinc, mercury and antimony, molybdenum, and nickel. A number of copper ore discoveries have been made which are now being assessed for their commercial value. Copper-bearing sandstones have been discovered in the sub-Carpathian region of Ukraine, as well as in the Bakhmut's and Kal'mius-Torets' depressions of the Donbass. Copper pyrites were found in the Dnieper region and in the Krivoriz'-Kremenchuts' zones. Porphyry copper deposits have been located in the Kons'ko-Rozdor region; copper-nickel sulfides in the central Dnieper region; and native copper deposits have been found at Volin (Volyn). The latter are being

assessed for their economic potential as they reportedly bear substantial similarity to the copper deposits of the Great Lakes region of the United States.

Although Ukraine did not possess a domestic gold mining industry in 1995, interest in the country's potential gold deposits has increased significantly in recent years. The country's main gold-bearing regions were the Ukrainian Precambrian shield (Pobuzh, Kirovgrad, and Central Dnieper regions), with resources believed to amount to 75% to 80% of Ukraine's gold producing potential; Donbass (Nagol'niy region), with about 10% of Ukraine's gold resources; and the Carpathian Mountain Zone with 15% of the country's gold resources. For a more in depth geological description of the gold ores in these regions, refer to the journal *Mineral'ni Resursi Ukraini*, Kiev, February 1995, pages 8-12.

Each of Ukraine's three gold-bearing regions reportedly were believed to have the potential to form a basis for the country's gold mining and processing industry. However, the Carpathian Mountain Zone appeared to be the mostly likely area for initiating development.

Ukraine reported two potential mining areas for the development of lead and zinc. The first region is in the Carpathian Mountains with gold-lead and zinc-bearing polymetallic deposits in the Beregovsk area. The Donbass forms the second potential region where lead and zinc mineralization is found in breccias associated with deep salt domes. These deposits have complex geologic conditions and are characterized by relatively low metal content. Reportedly, the Government of Ukraine plans to develop the Muzhievskoye lead-zinc deposit in the Carpathian Mountains to supply domestic industry.

According to information presented at the International Magnesium Association conference in Yamaguchi, Japan, June 2-4, 1996, in a paper entitled *Magnesium Industry in Russia* by Pavel G. Detko and Adrey B. Kudlay, Ukraine possessed two of the four magnesium production plants that were operating in the FSU. The Zaporozhye titanium-magnesium plant, built in 1935, was the first titanium sponge plant in the FSU, with magnesium production based on the electrolysis of carnallite from the Verkhne Kamsk deposit in the Urals in Russia. Production of magnesium for sale at Zaporozhye had stopped in 1992. The Kalush magnesium plant of the Kalush "Chlorvinyl" Industrial Association was the newest facility built in the FSU with the source of raw materials brines from a fertilizer plant that processed material from the Ivano-Frankovsk mixed potassium-magnesium deposit in Ukraine. The treated brines are used in the preparation of artificial carnallite for magnesium production. Output of magnesium for sale at Kalush had fallen from a peak of 18,000 t in 1986 to 12,000 t in 1994, but had increased to 13,000 t in 1995.

In 1995, Ukrainian nickel mine reportedly remained at its 1994 level. The country has small deposits of nickel silicates associated with weathered ultrabasic rocks in the Pobuzh and Central Dnieper regions, with the former region

reportedly having the largest share of nickel resources. However, Ukraine has been experiencing depletion of its nickel reserves. It was projected that the Lipovenkovskoye nickel deposit in central Ukraine could be depleted in 5 years. Therefore, the Ukrainian Ministry for Industry was considering developing the Tarnovatskoye nickel deposit containing an estimated 4.94 Mt of ore with a 16-year mine life expectancy. Ores at Tarnovatskoye are graded at 0.96% nickel compared with 0.65% at Lipovenkovskoye. Ukraine produced only ferronickel from its nickel ores with one plant producing ferronickel at Pobugskoye in the Kirovgrad region.

Ukraine was the sole mine producer of titanium ore in the FSU. About 80% of the country's mine output of titanium was processed at industrial enterprises in other republics of the FSU (Russia and Kazakstan). The balance of Ukraine's titanium ore was consumed by the country's sponge-producing enterprise at Zaporizhya (Zaporozhye) and pigment plants at Sumy and Armyansk on the Crimean Peninsula.

In 1995, titanium was mined at two secondary placer fields in Ukraine, the Irsha and Verkhnedneprovsk. At the Irsha field, mining operations began in the 1950's. Buried sands along the channel of the Irsha River (near Zhitomir) and sands in areas exposed to seasonal flooding began to be worked in 1951. Titanium-bearing horizons in the sands, which were 2 to 8 meters (m) in thickness at depths ranging from 3 to 12 m, contained 1.2% to 4.8% ilmenite, yielding a lower-grade ilmenite concentrate (50% to 56% TiO₂) that served as a feedstock for pigment production. Mining at the Irsha field has featured a combination of dredging, hydraulic operations, and shallow open pit workings, depending upon the workability of sands and their location relative to the water table and the main river channel. At present, all reserves at the "dredging fields" of the original deposits at Irsha have been exhausted.

Since the early 1970's mining has been shifting to new deposits at the Irsha field (Valki-Gatskovo, Lemnen, Shershnevskiy) with reserves that are only a fraction of those of the initial placers. Because of rapid depletion, it was expected that there would be a sharp decline in the production of concentrates from Irsha beyond the year 2000. The capital required to bring on-stream still newer deposits in the Irsha field (Stremigorodskiy, a residual placer [weathering crust] and Torchinskiy, an alluvial placer) is believed to be so large as to be beyond the capacity of the Irsha enterprise without the assistance of outside investors.

The second major titaniferous placer field, the Vekhnedneprovsk (Upper Dnieper), unlike Irsha, contains complex ores that include ilmenite, rutile, and zirconium. Presently, it is the largest mine producer of titanium in Ukraine, with the greatest output coming from the Malyshevskiy deposit. Mining has occurred at seven open pits, the first six have been depleted. The average thickness of exploitable titanium-bearing sands in the pits (former sea bottom deposits [marine placer]) has ranged from 11 to 14.5

m under 38 to 42 m of overburden. Unlike the situation at the Irsha fields, the Malyshevskiy deposit was believed to be exploitable for about 25 more years, although with a substantial decline in output. Considerable development potential reportedly exists in the Eastern sector of the deposit, but so far the Verkhnedneprovsk Mining and Metallurgical Integrated Works has lacked the capital necessary to develop new mining operation. Longer-term plans to develop the new Matronovskiy deposit have faced similar difficulties.

Lower-grade ilmenite concentrates from Verkhnedneprovsk (50% to 56% TiO₂) have been used in pigment production, and part of the higher-grade concentrates (56% to 65% TiO₂) were used for titanium sponge production and part for ferrotitanium production. Titanium produced from rutile concentrates from this field find special uses in the production of welding-rod coatings, among other things.

Foreign commercial activities in the country's titanium industry in 1995 included a joint venture between the Government of Ukraine and Renison Goldfields Consolidated to explore and evaluate titanium deposits with the potential for large-scale development as well as several tailings piles containing commercial quantities and grades of ilmenite.

Ukraine was reported to have a fairly broad range of industrial minerals in amounts sufficient for most domestic needs as well as for export. The country's resources of some industrial minerals such as graphite appear to be substantial and Ukraine was the major producer of graphite in the FSU. Estimated undiscovered resources of graphite in the Ukrainian shield (Mariupol', Petriv, Zavaliv, etc.), as well as newly discovered sites at Burtin, Balakhiv, and Sachkinko-Troitsk were according to Mineral'ny Resursi Ukraini, Kiev, February 1995, page 7, in excess of 2 billion t. Also, according to a paper presented at the 12th Industrial Minerals Congress by Charles Watts-Jones, Ukraine has three of the FSU's eight soda ash plants with a total annual capacity of over 1,500 t of soda ash. The Ukrainian plants use the Solovay process and make use of local salt and limestone deposits.

Moreover, diamonds were first discovered in Ukraine in 1949 as well as kimberlite pipes and dykes. Further exploration recently has been proposed in the Azov, central Pobush, and Volyn-Podolya, areas which according to the journal Mineral'ni Resursi Ukraini, Kiev, January 1995, pages 4-5, have the most promising potential for diamond discoveries.

In 1995, the joint-venture Keramedra was formed between Ukraine and Slovakia to manufacture semifinished china clay products for the ceramics, rubber, and plastics industry. The joint venture will explore and develop the Beregovovo china clay deposit in the Zarkapatska region. Ukraine reportedly has 20 primary kaolin deposits in 10 regions, of which 13 of these deposits having combined reserves of 460 Mt were under development. Total primary

kaolin reserves were reportedly 996 Mt.

The largest china clay producers were the Glukhovetsky mining-beneficiation complex in the Vinnitsa region which supplies raw materials for paper and cardboard manufacturing and the Turbov china plant in the Vinnitsa region. In 1995, primary kaolin production in Ukraine was 950,000 t, having decreased by 65,000 t compared with 1994, of which 257,523 t was exported to Italy, Poland, Russia, Slovakia, and other countries.

Ukraine, which is one of the leading countries in Europe in facing stone reserves, has only developed a small portion of these reserves. Ukraine reportedly is exploiting 70 stone deposits, including 32 granite deposits. The country in 1994 cut 27,344 cubic meters (m³) of facing stone blocks and decorative tiles and 111,000 m³ of granite. The country reportedly has explored reserves of 507.5 million m³ of stone in 131 stone deposits, including 208.2 m³ of granite at 47 deposits. In 1995, a United States-Ukrainian joint-venture "Biyutaga" was formed to quarry granite at the Tovoskoye deposit in Dnepropetrovsk oblast. The project will produce granite blocks and tiles to be used mainly in construction of a subway network in Dnepropetrovsk.

In 1995, Ukraine's coal production decreased by 11% compared with 1994 to 83.6 Mt. This figure may be even lower than reported as the Ministry of the Coal Industry in conjunction with the Ministry of Statistics significantly increased the norm for ash content. Furthermore, the sulfur content of coal from Ukraine is high with coal with up to 4% sulfur content being burned at powerplants.

Coal is the country's major energy source and accounts for over 40% of electric power generation. However, coal-fired powerplants in Ukraine generally have to be boosted with natural gas or boiler fuel. In 1995, powerplants were reported working at only 40% of capacity because of fuel shortages.

Because of decreasing coal production, Ukraine was importing coal, mainly from Russia and Poland. Ukraine also exported coal to acquire hard currency. Although plans called to close 15 coal mines by yearend 1995, only 6 were closed, so that 262 coal mines would remain open in 1996. The coal mining work force in 1995 decreased by 9.3% compared with 1994 to 426,000 persons, and was about 20% below the employment level of 529,000 in 1992. The decrease in the number of miners and the increase in strikes were attributed in part to the country's inability to make timely wage payments to miners.

Plans call for Ukraine to increase coal production capacity to between 150 and 155 Mt/yr by 2005 and to 170 Mt/yr by 2010-2016. Development of 1 open pit and 21 underground mines is planned. Total new capacity of 38.6 Mt/yr is planned, of which new mining development is planned to be producing 7.5 Mt/yr by 2005. The country will have to obtain investment funds to carry out this program. The country has not allocated funds for new mine construction for several years and existing mines are badly in need of funding

for maintenance and renovation.

In 1995, Ukraine reportedly produced 18.17 billion m³ of natural gas which was 1% less than the amount produced in 1994. Ukraine's natural gas production covers about 20% of the country's consumption needs. Slightly under 20% of the electricity generated in the country is from powerplants operating on natural gas. In 1995, Ukraine received 51.2 billion m³ of natural gas from Russia, and was Russia's main gas customer in the FSU. As of December 1995, Ukraine reportedly owed Russia over 9.2 trillion rubles for natural gas.

Ukraine in 1995 produced 3.02 Mt/yr of crude petroleum which was a 5% decrease in production compared with 1994. Ukraine received 10.9 Mt of oil from Russia in 1995 and was Russia's largest customer for oil in the FSU. Ukraine also in 1995 imported 2.4 Mt of oil from Kazakhstan. In April 1995, the European Bank for Reconstruction and Development provided a loan to the Poltava Petroleum Company, a Ukrainian-British joint venture to develop the Ignatovskoye field in the southern Poltava region in central Ukraine. Production from this field is projected to be about 250,000 t/yr of crude oil.

In 1995, Ukraine's five nuclear powerplants produced 70.5 billion kilowatt hours of electric power, which was a 2.4% increase compared with 1994. In 1995, nuclear power accounted for 36.7% of electricity generated. Reportedly there were 85 malfunctions at nuclear powerplants in 1995, which was less than 1994 with 133 and 1993 with 167. Ten of the malfunctions were deemed to be level one on the international scale and the remainder were deemed zero. The most malfunctions occurred at the Zaporozhye nuclear powerplant with 35 and the least at Chernobyl with 3.

Although it has one of the largest mineral industries in the FSU, Ukraine's mineral industry faces great economic difficulties in making the transition to a market economy in terms of modernization and rationalization, which is of particular need in those mineral industry sectors with depleting deposits and deposits with low quality or low grade ores, and for those sectors not producing products competitive on world markets. If adequate investments are made, it may be possible to produce a wider range of concentrates and products that meet world standards, but the cost of such investment will be assessed in terms of the potential profitability of such industries.

These issues apply to Ukraine's ferrous metals mining, steel and ferroalloys industries. However, Ukraine possesses practically all of the ingredients to engage in full cycle production of ferrous metals and downstream products. Ukraine has iron ore and manganese mines and steel and ferroalloys plants, all within close proximity as well as a large machine building sector and a well trained and relatively inexpensive labor force. Ukraine also is situated on the Western border of the FSU as well as on the Black Sea and thus has good access to European and world markets. The combination of the availability of raw

materials, processing facilities, manufacturing facilities, low priced and well trained labor, and good access to markets, may offer creative investment opportunities for producing value added products from ferrous metals.

Ukraine also possesses undeveloped or underdeveloped mineral resources including graphite, titanium, and a range of industrial minerals that may offer opportunities for future development.

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Other Sources of Information

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TABLE 1
UKRAINE: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995
METALS				
Alumina	1,250,000 r/ 2/	1,200,000 r/	1,200,000	1,230,000 2/
Aluminum:				
Primary	100,000 2/	100,000	100,000 r/	98,000 2/
Secondary	72,000 2/	50,000	40,000	40,000
Total	172,000	150,000	140,000 r/	140,000
Cadmium	5 2/	7	10 2/	10
Ferroalloys				
Blast furnace:				
Ferromanganese	50,000	40,000	30,000	30,000
Spiegeleisen	5,000	4,000	3,000	2,500
Electric furnace:				
Ferromanganese	100,000	80,000	60,000	60,000
Silicomanganese	1,000,000	700,000	600,000	500,000
Ferrosilicon	500,000	400,000 r/	350,000 r/	300,000
Ferronickel	100,000 r/	60,000 r/	38,800 2/	38,800
Other	40,000	30,000 r/	25,000 r/	25,000
Total	1,795,000	1,314,000	1,106,800	956,300
Germanium	20 2/	21	22 2/	22
Iron ore	75,700,000 2/	65,000,000	51,300,000 2/	51,000,000 2/
Lead, metal	20,000 2/	15,000	15,000 2/	5,000 2/
Magnesium	16,000 r/	15,000 r/	12,000 r/	13,000
Manganese:				
Marketable ore 2/	5,820,000 3/	3,800,000	2,979,900	3,200,000
Mn content	1,850,000 2/	1,350,000 2/	1,050,000 2/	1,060,000
Mercury	100	80	60	60
Nickel, mine output, metal content	5,900 2/	3,000	1,400 2/	1,400
Pig iron	35,300,000 2/	30,000,000	21,200,000 2/	20,000,000 2/
Silicon	1,300 2/	1,300	1,400 2/	1,400
Steel:				
Crude 2/	41,800,000	32,400,000	23,798,000	23,000,000
Finished	29,500,000 2/	20,000,000	17,500,000 2/	17,000,000
Pipe	5,100,000 2/	3,000,000 r/	1,600,000 2/	1,600,000
Tin	4,000 2/	3,000	2,000	2,000
Titanium:				
Ilmenite concentrates	450,000 r/ 2/	450,000 r/	530,000 2/	359,000 2/
Rutile concentrate	60,000 2/	60,000 r/	80,000 2/	112,000 2/
Metal, sponge	12,800 2/	10,000	5,000	300 2/
Zinc, metal	20,000 2/	15,000 r/	10,000 r/	3,100 2/
Zirconium concentrates	40,000 2/	40,000 r/	40,000	40,000
INDUSTRIAL MINERALS				
Cement	17,000,000	22,000,000	11,400,000 2/	11,000,000
Graphite	10,000 r/	7,000 r/	5,500 2/	6,000 2/
Nitrogen : N content of ammonia	3,908,000 2/	3,242,000 2/	3,000,000 r/	3,100,000
Potash: K ₂ O content	225,000	200,000	168,000 2/	110,000 2/
Salt	8,000,000	6,000,000	3,940,000 2/	3,500,000
Sulfur, native	800,000	600,000	392,000 2/	310,000 2/
MINERAL FUELS AND RELATED MATERIALS				
Coal 2/	134,000,000	115,700,000	95,300,000	83,600,000
Coke	27,500,000 2/	25,000,000	17,000,000 2/	15,000,000
Natural gas	20,900,000	19,300,000	18,300,000 2/	18,170,000 2/
Petroleum, crude	4,480,000	4,250,000	3,177,000 2/	3,020,000 2/

r/ Revised.

1/ Table based on information and data available through July 28, 1996.

2/ Reported data

TABLE 2
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facility	Location	Annual capacity e/
Alumina	Nikolayev refinery	Nikolayev (Mykolayiv) 1/	1,200,000
Do.	Zaporozh'ye (Dneprovsk) refinery	Zaporozh'ye	245,000.
Aluminum, primary	Zaporozh'ye (Dneprovsk) smelter	do.	110,000.
Coal:			
Hard	Donets coal basin with about 225 mines produces more than 90% of Ukraine's coal	Donetskaya (Donets'ka) 1/ Dnepropetrovskaya (Dnipropetrovs'ka)1/ Luganskaya (Luhans'ka) 1/ oblasts	130,000,000.
Do	L'vov-Volynskiy basin produces remainder from 18 mines	Western Ukraine	6,000,000.
Brown	Dneprovskoye basin	Central Ukraine	7,000,000.
Dolomite	Novotroitskoye, Severskoye mining administrations	Novotroitskoye deposit, Yamskoye deposit	3,000,000 (total).
Do.	Dokuchayevskiy Flux-dolomite complex	Yelenovskoye and Stylskoye deposits	
Graphite	Zavalyevskiy graphite complex	Zavalyevskiy deposit	80,000.
Iron ore			
Do.	Underground mining: Krivbassruda production association with 16 mines	Kryvoy Rog basin	30,000,000.
Do.	Ekspluatatsionnaya Mine of the Zaporozhskiy iron ore complex	do.	3,500,000.
Do.	Open pit mining: Yuzhniy, Novokrivorozhskiy, Tsentralnyy, Severnyy, Inguletskiy, Poltavskiy and Kamysh-Burunskiy mining and beneficiation complexes	do.	90,000,000 (total).
Lead, secondary	Ukrtsink plant	Konstantinovka (Kostyantynivka) 1/	70,000
Magnesium	Zaporozh'ye plant	Zaporozh'ye	10,000.
Do.	Khlorvinil concern	Kalush	20,000.
Manganese ore, marketable	Ordzhonikidze, Marganets mining and beneficiation complexes	Nikopol basin	7,000,000 (total).
Do.	Tavrisheskiy mining and beneficiation complex (under development)	Bol'shoy Tomak basin	
Ferroalloys	Nikopol ferroalloys plant	Nikopol	250,000 (ferromanganese).
Do.	do.	do.	1,200,000 (silicomanganese).
Do.	do.	do.	3,000,000 (manganese sinter).
Do.	Stakhanov plant	Lugansk	NA (ferrosilicon).
Do.	Zaporozh'ye plant	Zaporozh'ye	300,000 (ferrosilicon) . 160,000 (silicomanganese). NA (ferrochrome). NA (ferromanganese). 40,000 (manganese metal).
Mercury	Nikitovskiy mining and metallurgical complex	Donets basin	120.
Nickel	Pobuzhskiy mining and metallurgical complex, comprising three open pit mines and smelter	Pobuga region	7,000 (nickel in ferronickel).
Potash	Khlorvinil production association, Stebnik potash plant	Pricarpathian region	300,000 (K ₂ O).
Steel, crude	Azovstal plant	Mariupol	7,000,000.
Do.	Donetsk plant	Donetsk	2,000,000.
Do.	Kommunarsk plant	Kommunarsk (Alchevsk) 1/	4,500,000.
Do.	Kryvoy Rog plant	Kryvoy Rog	14,000,000.
Do.	Makeyevka plant	Makeyevka	4,000,000.
Do.	Mariupol plant	Mariupol	7,000,000.
Do.	Zaporozh'ya plant	Zaporozh'ya	5,000,000.
Sulfur	Sera production association	Rozdol mining complex mines, Rozdol, Soroks, Zhidachev Deposits. Yavorov complex mines. Nemirov and Yazov deposits in L'vovskaya (L'vivs'ka) 1/ and Kiev (Kyivs'ka) 1/ oblast	1,500,000 (total).
Titanium, ilmenite and zircon-rutile-ilmenite ores	Irshanskiy mining and beneficiation complex Verkhnedneprovskiy mining and metallurgical complex	Irsha River valley Verkhnedneprovsk region	600,000 (ilmenite concentrate). 2/ 120,000 (rutile concentrate). 40,000 (zirconium concentrate).
Titanium, metal	Zaporozh'ye plant	Zaporozh'ye	20,000.
Uranium	Zheltye Vody complex	Northern part of Kryvoy Rog basin	NA.
Zinc, secondary	Ukrtsink plant	Konstantinovka (Kostyantynivka) 1/	25,000

e/ Estimated NA Not available.

1/ New name or spelling given, if available, in parenthesis.

2/ Total for both enterprises